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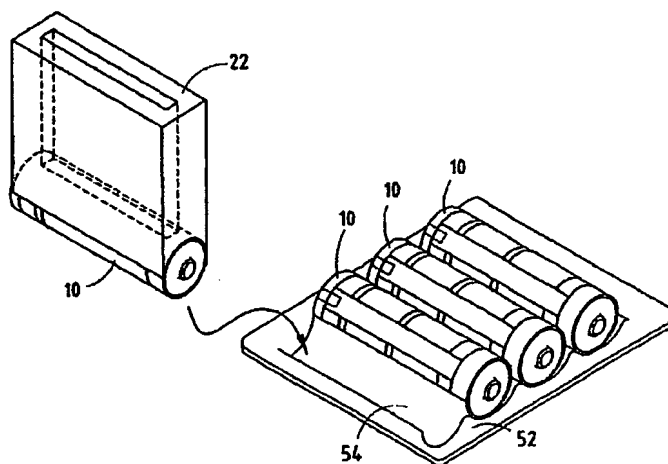
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(54) Title: PRODUCT ORIENTATION USING INVISIBLE MARKING



(57) Abstract: System and method of arranging products, such as batteries (10), in a display package (52) according to a desired orientation with efficient space utilization. The method includes providing products to be packaged, and applying an invisible orientation marking (16) on each of the products. The orientation marking (16) is visible when illuminated with ultraviolet light (34) and is generally invisible to consumers under normal ambient light conditions. The method also includes illuminating the products with ultraviolet light, scanning each of the products, detecting the orientation marking on each of the products, orienting each of the products based on the detecting steps, and disposing each of the oriented products in a package so that the products have a desired orientation.

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## PRODUCT ORIENTATION USING INVISIBLE MARKING

5 The present invention generally relates to product packaging and, more particularly, to a method and system of arranging products, such as alkaline batteries, in display packages according to a desired orientation.

10 A common practice for packaging and displaying small and lightweight retail items, such as alkaline batteries, is to package the items in thermoformed blister packages and place the packages on shelves or hang the packages on hooks on various display racks. Conventional battery packages are generally composed of a display card which provides a generally stiff supportive backing, usually composed of cardboard, and a thermoformed polymeric blister that is bonded to the display card. The display card provides support for displaying the merchandise for sale and usually contains print with  
15 suitable indicia, such as advertising, trademarks, and instructions.

In accordance with one battery packaging approach, the thermoformed blister generally comprises a piece of clear polymeric material, e.g., plastic, heat sealed to the display card. According to another approach, a clam-type thermoformed polymeric  
20 blister generally having a shape to fit over and cover the batteries is sandwiched between two layers of the display card. The blister isolates the products from the purchaser and prevents inadvertent damage to the products that can result from repeated handling prior to sale, while further allowing for the orderly display of products for sale to purchasers.

25 It is sometimes desirable to orient some products, such as alkaline batteries, within the blister package so that the graphics printed on the product label are readily recognized and may appear more attractive to consumers, especially when the products are packaged in clear blister packages. In the past, battery packaging techniques have employed a colored marking, generally in the shape of a bar, printed on the label near  
30 one end of the battery to serve as a registration mark for use to orient the battery in a blister package. The conventional colored orientation marking is always visible under

normal ambient light conditions. In doing so, an entire circumferential area of the battery is generally dedicated solely to the registration mark, which therefore limits the available space for graphics that may otherwise be applied to the battery label. In today's battery sales market, it has become increasingly desirable to maximize the area  
5 available for graphics and print, which includes advertising, trademarks, and instructions, as well as to provide a battery tester on the label of the battery. However, due to the limited amount of space available on small products, such as alkaline batteries, it can be difficult to apply a conventional colored orientation marking.

10 Accordingly, there is a need, heretofore unfulfilled, for a relatively inexpensive product package arrangement and method of arranging products in a package according to a desired orientation. It is further desirable to provide for product orientation in a display package in a manner that does not limit the amount of space available for print and other features, such as battery testers, on the labels of batteries.

15 The present invention provides for a system and method of arranging products, such as batteries, in a display package according to a desired orientation in a manner that allows for maximum utilization of space for graphics. To achieve this and other advantages, and in accordance with the purpose of the invention as embodied and  
20 described herein, the present invention provides for a method of providing one or more products to be packaged, and applying an invisible marking on the one or more products. The marking is generally indistinguishable to consumers under ambient light conditions. The method further includes the steps of scanning each of the one or more marked products, detecting the marking on each of the one or more products, orienting  
25 each of the one or more products based on the detecting step, and disposing each of the oriented products in a package so that each of the one or more products has a desired orientation.

According to another aspect of the present invention, a battery package is  
30 provided comprising a blister package having a housing defining a compartment, and one or more products disposed in the blister package. Each of the one or more products has an orientation marking that is generally invisible to the naked human eye and

therefore indistinguishable to consumers under normal ambient light conditions. Each of the one or more products is oriented in a desired orientation in the blister package based on the invisible orientation marking.

5        According to a further aspect of the present invention, a system of arranging products in a display package is provided comprising a marking device for applying an invisible orientation marking to each of one or more products. The invisible orientation mark is generally indistinguishable to consumers under normal ambient light conditions. The system also has a scanner for scanning each of the products to determine the  
10       location of the invisible orientation marking, and a pick up assembly for engaging each of the one or more products based on the detected orientation marking and placing each of the products in a display package so each of the products is oriented in a desired orientation according to the orientation marking. Accordingly, the invisible orientation marking is not readily seen under ambient light conditions and, as such, may be applied  
15       over other print indicia without limiting the space available for print and other features.

The present invention will be further understood by reference to the drawings, in which:

20       Figure 1 is a perspective view of an alkaline battery having an ultraviolet readable orientation marking applied to the label according to the present invention;

Figure 2 is a diagrammatic view of a battery packaging assembly for orienting batteries for packaging in blister packages;

Figure 3 is a diagrammatic view further illustrating the orientation of one battery with the battery packaging assembly of Figure 2;

25       Figure 4 is a block diagram further illustrating the battery packaging assembly of Figure 2;

Figure 5 is a diagrammatic view illustrating the packaging of oriented batteries in a blister package;

30       Figure 6 is a front perspective view of a battery package containing four batteries oriented according to the present invention; and

Figure 7 is a flow diagram illustrating a method of packaging batteries to achieve a desired orientation according to the present invention.

Referring to Figure 1, a cylindrical alkaline battery 10, i.e., electrochemical cell, is illustrated therein. The battery 10 is shown as a single electrochemical cell having a steel can containing electrochemically active materials. The can has a closed bottom end, cylindrical side walls, and an open top end sealed closed with a cover and seal assembly as is well-known in the battery manufacturing art. The battery 10 also has a label 12 applied to the outer walls of the cylindrical can as is generally known in the art. The battery label 12 may include print containing suitable indicia, such as advertising, trademarks, instructions, and may further include a battery tester or other features. A substantial amount of the space that is available on the battery label 12 may contain print so as to maximize use of the battery label space to advertise the product and provide packaged product that is aesthetically pleasing to consumers.

According to the present invention, the battery 10 has an invisible orientation marking 16 applied on the label 12. The invisible orientation marking 16, shown in phantom, preferably includes an ultraviolet light readable marking that is generally invisible to the naked human eye and is therefore indistinguishable to consumers under normal ambient light conditions. The invisible orientation marking 16 may include a fluorescent agent such as 2, 5-thiophenediylbis combined with a polymer such as paint or ink. The invisible orientation marking 16 phosphoresces only when illuminated with ultraviolet light to emit light at a frequency that can be detected by a sensor. Examples of known ultraviolet light readable materials are disclosed in U.S. Patent Nos. 4,238,524, and 4,725,078. It should be appreciated that the invisible orientation marking 16 may be applied over the top of visible printed ink 14 provided on the battery label 12 and, because the invisible orientation marking 16 is not visible to the naked eye of consumers under normal ambient light conditions, the marking 16 does not interfere with the printed ink 14 provided on the battery label 12. While one orientation marking 16 is shown, it should be understood that two or more orientation markings 16 may be employed on each product.

Referring to Figure 2, a product orientation assembly for orienting and packaging batteries is illustrated therein. The orientation assembly includes a plurality

of rollers 20 spaced apart from one another and arranged side by side to hold and spin product, such as batteries 10. For N number of batteries, the assembly generally requires N+1 rollers. According to the example shown, a total of nine rollers 20 are shown holding eight batteries 10. Rollers 20 are preferably activated by a motor (not shown) to spin in synchronization with each other. Disposed below and between adjacent rollers 20 are a plurality of solenoid actuated push bars 30 which are extendable upward in the space between adjacent rollers 20 and are actuatable to force the battery 10 upward and away from rollers 20.

10       The orientation assembly further includes a plurality of pickup mechanisms 22 which are movable in position above the batteries 10. Each of pickup mechanisms 22 has a vacuum lift chamber 26 leading to a curved semi-cylindrical bottom surface 24 which conforms to the shape of the cylindrical side walls of the battery 10. Pickup mechanism 22 is actuatable to a position directly above a corresponding battery 10.

15       With a vacuum applied to the vacuum chamber 26 and the push bar 30 actuating a battery 10 upward towards the bottom surface 24 of pickup mechanism 22, the actuated battery 10 is picked up and held by pickup mechanism 20, and is thereafter movable in a desired orientation to a battery package.

20       Referring to Figure 3, the orientation of one of batteries 10 is further illustrated therein. During the orientation process, battery 10 is placed on a pair of rollers 20 and an ultraviolet light source 34, preferably located on the same side of battery 10 as a photo detector 32, illuminates the battery 10 with ultraviolet light so as to phosphoresce the fluorescent whitening agent in the invisible orientation marking 16. The ultraviolet

25       light source 34 is applied to at least a portion of the battery label 12 containing the invisible orientation marking 16. The pickup mechanism 22 is further shown assembled to a vacuum hose 36 which leads to a vacuum source 38, such as a reverse pumped air compressor, for creating a vacuum in vacuum chamber 26. The pushup mechanism 30 is further shown connected to a solenoid for actuating the pushup mechanism 30 upward

30       when a certain orientation of battery 10 is detected.

To determine the orientation of the battery 10, photo detector 32 is positioned adjacent to battery 10 at a location to scan for the invisible orientation marking 16. According to the example shown, the photo detector 32 is placed near one end of battery 10 in an area where the orientation marking 16 is expected to be located. As the battery 10 spins in response to rotation of rollers 20, ultraviolet light source 34 illuminates the battery 10 and photo detector 32 detects the presence of orientation marking 16 and, upon reaching a desired orientation, the pushup mechanism 30 is actuated by solenoid 40 to force battery 10 upwards and into a held position on the pickup assembly 22. Additionally, the ultraviolet light source 34 and photo detector 32 could be housed together and aligned with each other to detect the orientation marking 16.

Referring to Figure 4, the orientation assembly is further illustrated in the block diagram shown therein. The photo detector 32 may include a detector lens 42 for detecting the presence of visible colors when ultraviolet light is applied to the product, and a color filter 44 for identifying a specific predetermined color. In addition, photo detector 32 includes a photo transistor 46, an amplifier 48, and a switch 50 for generating a signal upon detecting the predetermined color indicative of the detection of the orientation marking 16.

The orientation assembly also includes a programmable logic controller (PLC) 58. Controller 58 monitors the signal output from switch 50 of photo detector 32, which indicates the detection of the orientation marking 16. Controller 58 is preferably configured to control actuation of the solenoid 40 to actuate push bar 30 and to control the vacuum generated by vacuum source 38. Further, controller 58 may also control the actuation of ultraviolet light source 34 to turn the ultraviolet light source on and off. It should also be appreciated that controller 58 may control other mechanisms such as the actuation of rollers 20. It should be further appreciated that the assembly shown herein may sense the orientation of any number of products, such as batteries 10, and control any of a number of pickup assemblies, solenoids, and vacuum lifts to orient and package a predetermined number of products at the same time.



Referring to Figure 5, the packaging of individual batteries 10 into a clear thermoformed polymeric blister package 52 is illustrated therein. The pickup mechanism 22 is movable to position the battery 10 above the blister package 52 and to dispose the battery 10 into a compartment 54 in blister package 52. Once the battery 10 is disposed in the blister package 52 in the desired orientation, the vacuum source 38 is turned off to release battery 10 from pickup mechanism 22 and mechanism 22 returns to the orientation assembly. As shown, each of the batteries 10 is oriented in a desired orientation with the blister package 52. Once the blister package contains all the batteries with the desired orientation, a display card 58 may be heat sealed or otherwise attached to the blister package to provide a fully assembled battery package 56 as shown in Figure 6. The display card 58 preferably contains the batteries 10 to prevent movement of the batteries 10 relative to the package following package assembly. Accordingly, each of batteries 10 is oriented in a desired orientation to provide a battery package that is aesthetically pleasing to consumers and has the maximum positive impact on consumers.

Referring to Figure 7, a method 70 of orientating and packaging products, such as batteries, in a blister package according to a desired orientation is illustrated therein. The method 70 includes step 72 of applying an ultraviolet light readable orientation marking to the outside surface of the battery label. The orientation marking may be applied prior to or following assembly of the label onto the battery, and may be coated with a clear film. The orientation marking is preferably located relative to the print on the battery label to enable orientation of the battery based on the detected position of the orientation marking.

Proceeding to step 74, a plurality of batteries is arranged on the orientation assembly. Once in place on the orientation assembly, the plurality of batteries is spun, preferably at a constant speed, by actuating the spin rollers. In order to detect the presence of the ultraviolet readable orientation marking, step 78 includes applying ultraviolet light to at least a portion of the battery containing the orientation marking so that the orientation marking phosphoresces and is readable when illuminated with ultraviolet light. Step 80 continuously monitors each of the batteries as they are spun to

detect the presence of the orientation marking. When the corresponding photo detector detects the desired orientation of a particular battery, the solenoid actuated push member 30 aligned therewith is actuated in step 82 to force the battery 10 into position on the pickup assembly 22. Thereafter, in step 84, the oriented battery is disposed in a clear blister package, and the battery package assembly is completed in step 86 by adding the display card as is known in the battery packaging art. According to the orientation and packaging method 70 of the present invention, one or more products are positioned in a blister package having a desired orientation using an invisible orientation marking that does not interfere with the appearance of the product to consumers under normal ambient lighting conditions.

Accordingly, the product orientation arrangement of the present invention provides for the orientation of product, such as alkaline batteries, in a display package. While a plurality of batteries are oriented as described herein, it should be appreciated that the present invention may be used to orient any number of products in a package without departing from the spirit of the present invention. In addition, it should be appreciated that while an ultraviolet readable orientation marking is preferably employed, it is conceivable that other types of markings that are generally invisible to consumers under normal ambient light conditions may be employed.

It will be understood by those who practice the invention and those skilled in the art, that various modifications and improvements may be made to the invention without departing from the spirit of the disclosed concept. The scope of protection afforded is to be determined by the claims and by the breadth of interpretation allowed by law.

**CLAIMS:**

1. A method of arranging product in a display package according to a desired orientation, said method comprising the steps of:  
5 providing one or more products to be packaged;  
applying an invisible marking on said one or more products, said marking generally being indistinguishable to consumers under ambient light conditions;  
scanning each of said one or more products;  
detecting said marking on each of said one or more products;  
10 orienting each of said one or more products based on said detecting step; and  
disposing each of said oriented products in a package so that each of said one or more products has a desired orientation.
2. A method according to claim 1, wherein said step of applying said marking  
15 comprises applying an ultraviolet readable marking.
3. A method according to claim 1 or claim 2, wherein said step of detecting further comprises applying ultraviolet light to said one or more products so that said ultraviolet light readable marking phosphoresces.  
20
4. A method according to claim 3, wherein said step of detecting includes detecting a predetermined color with a photo detector.
5. A method according to any preceding claim, wherein said step of scanning  
25 comprises rotating each of said one or more products relative to a detector.
6. A method according to any preceding claim, wherein said step of providing one or more products comprises providing one or more batteries for packaging in a battery display package.  
30
7. A method according to claim 6, wherein said battery display package comprises a transparent window.

8. A method according to claim 6 or claim 7, wherein said battery display package comprises a blister package.
- 5 9. A product display package containing one or more products arranged in a desired orientation, said package comprising:
- a blister package having a housing defining a compartment for compactly housing product; and
- one or more products disposed in said blister package, each of said one or more
- 10 products having an invisible orientation marking that is generally indistinguishable to consumers under normal ambient light conditions, wherein each of said one or more products are oriented in a desired orientation in said blister package based on said invisible orientation marking.
- 15 10. A package according to claim 9, wherein said package comprises a battery package for housing one or more batteries.
11. A package according to claim 9 or claim 10, wherein said invisible orientation marking comprises an ultraviolet light readable marking.
- 20 12. A package according to any of claims 9 to 11, wherein said blister package comprises a transparent window to allow viewing of the product in the package.
13. A package according to any of claims 9 to 12, wherein said marking is applied to
- 25 the outer surface of a label.
14. A system for packaging one or more products in a display package, said system comprising:
- a marking device for applying an invisible orientation marking to each of one or
- 30 more products, wherein said invisible orientation mark is generally indistinguishable to consumers under normal ambient light conditions;

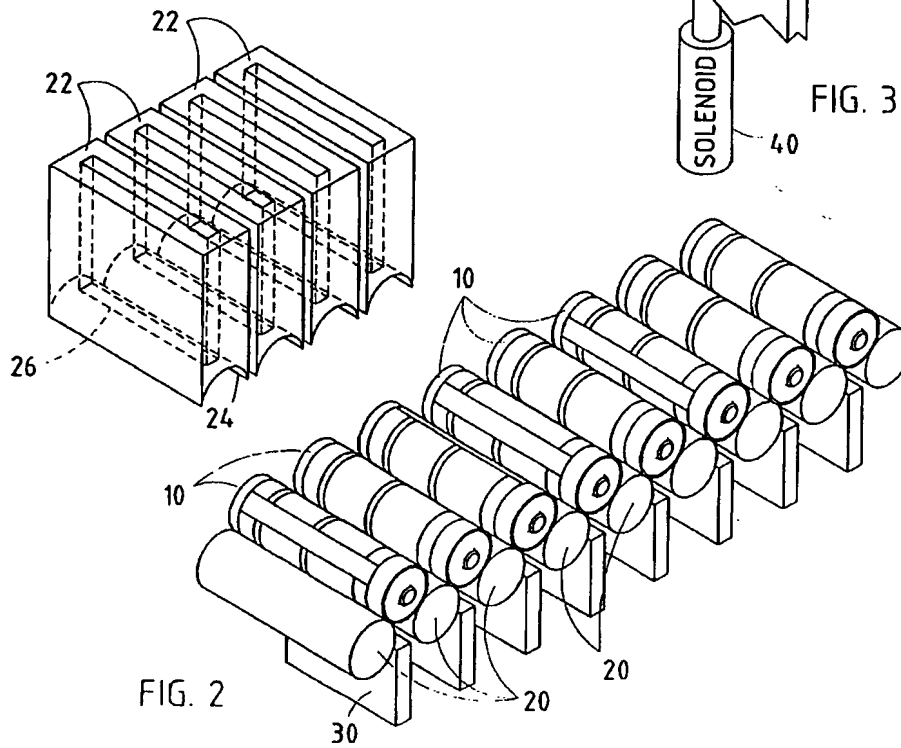
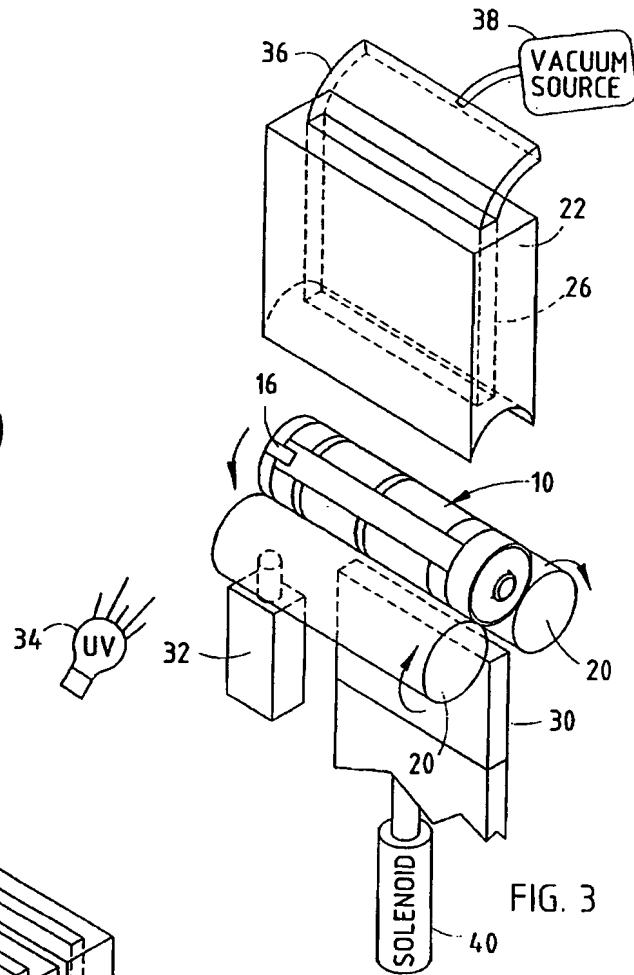
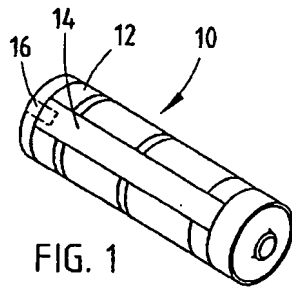
a scanner for scanning each of said products to determine the location of the invisible orientation marking; and

a pick up assembly for engaging each of said one or more products based on the detected orientation marking and placing each of said products in a display package so  
5 each of said products are oriented in a desired orientation according to the orientation marking.

15. A system according to claim 14, wherein said scanner comprises:  
a source of ultraviolet light for phosphorescing said orientation marking; and  
10 a photo detector for detecting the orientation mark under ultraviolet light.

16. A system according to claim 14 or claim 15, wherein each of said one or more products comprises a battery.

15 17. A system according to any of claims 14 to 16, wherein said marking devices applies said invisible marking to a label on each of the one or more products.



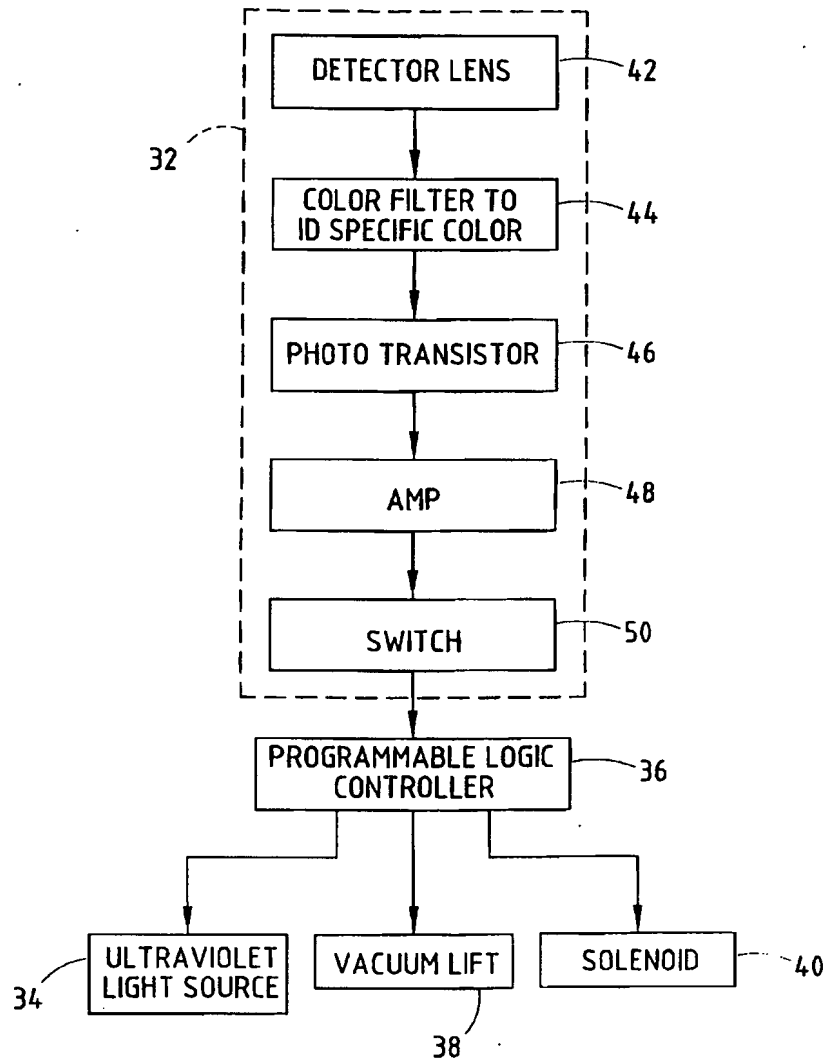
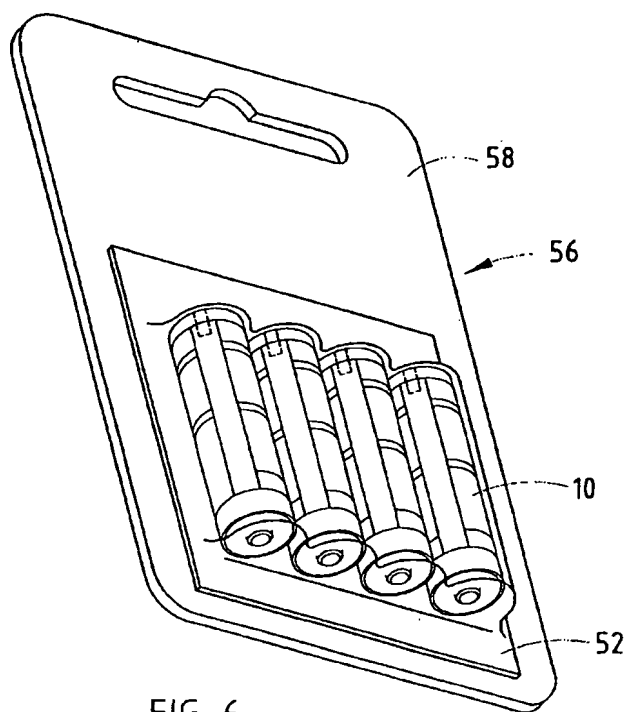
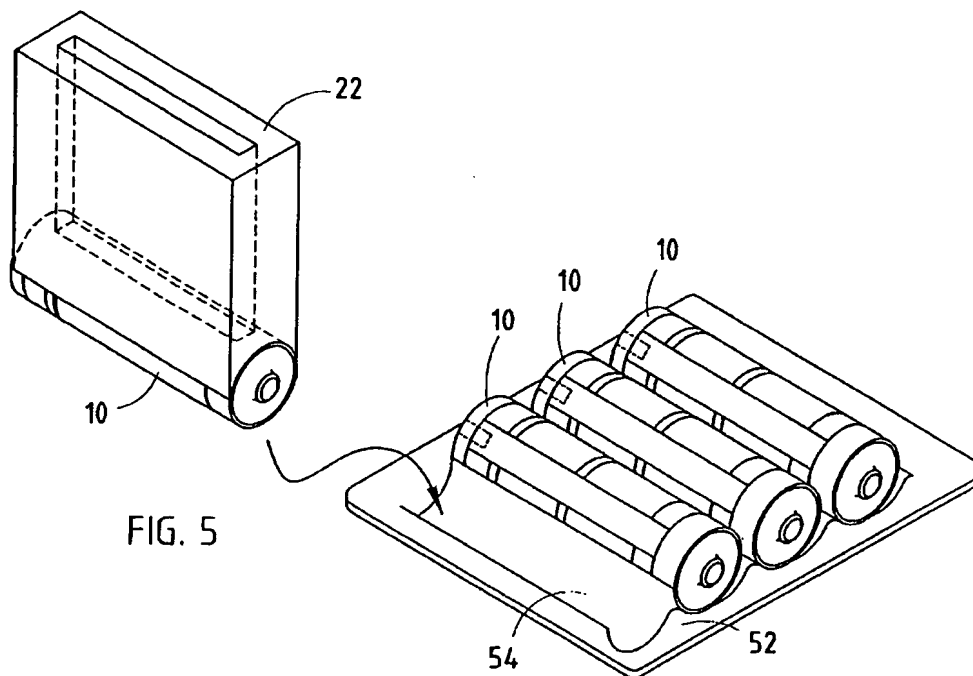


FIG. 4





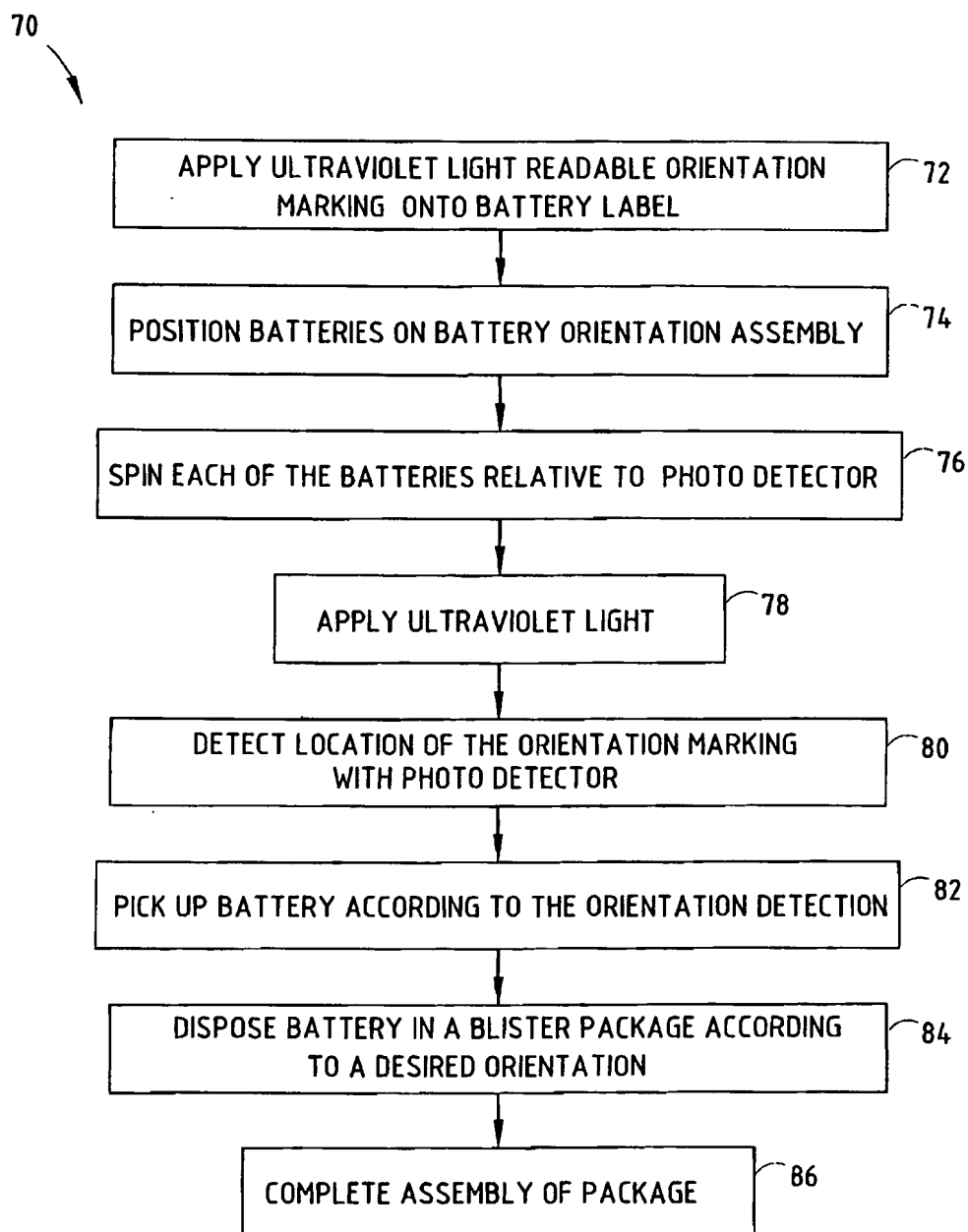


FIG. 7

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 01/03014

<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 B65B35/58 G09F13/42 B65G47/244 B65D75/34		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 B65B G09F B65G B65C B21D B65D		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 99 36317 A (PORTRAIT PASCAL ;MEAD CORP (US)) 22 July 1999 (1999-07-22) the whole document	1-17
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<input type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : *A* document defining the general state of the art which is not considered to be of particular relevance *E* earlier document but published on or after the international filing date *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) *O* document referring to an oral disclosure, use, exhibition or other means *P* document published prior to the international filing date but later than the priority date claimed *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. *Z* document member of the same patent family		
Date of the actual completion of the international search 19 June 2001		Date of mailing of the international search report 28/06/2001
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer Schultz, O

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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